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**The Mysore Agricultural and Experimental
Union.***

I THINK I need hardly tell you that I am extremely glad to be able to welcome you to this the second general meeting of the Mysore Agricultural and Experimental Union. Before attempting to present to you what seem to me some of the important problems for us as a Union to face, I feel it necessary to say a few words with regard to the origin of this venture.

It is now over two years ago, that the suggestion of forming some sort of society which would associate men of agricultural training and experience in the State was first broached to me by some of the younger members of the staff and former students of our Agricultural School. I had long felt that an organization which would bind together the young men of our Agricultural School and the staff of the Department was essential if much of the good from our agricultural education were not to be lost. I was therefore very pleased to have this spontaneous expression of a desire for close association.

It is not my place to give you an account of the development of this idea. The Secretary of the Union has this important

* Opening address delivered by Dr. Coleman at the Second Annual Meeting of the Mysore Agricultural and Experimental Union on November 3, 1919.

duty to perform. I should like, however, to say a few words with regard to the necessity of having such a union of agricultural workers in the State.

During the past ten years a great amount of effort has been expended upon the formation of Agricultural Associations all over the State. We have had State Agricultural Associations, Taluk Agricultural Associations and even Village Agricultural Associations. Some of these have undoubtedly done useful work but hardly a single one of them has shown real vitality. One by one they have ceased to exist or have become moribund. Is our Union destined to suffer the same fate?

In my opinion, the three main reasons why Agricultural Associations have been a failure in this State are (1) that they have been formed because it was thought the proper thing to have such associations and not because there was any real demand on the part of those interested in agriculture; (2) that they have consisted of members many of whom had no active connection with agriculture and (3) that they have not really known what to do.

If our Union cannot set itself firmly to avoid these causes of failure I think it would be better for us to shut up shop before we have even taken down our shutters. Are there any real grounds for believing that we shall be able to avoid them? I think there are.

In the first place the origin of this Union is not the result of Government fiat or of any such feeble impulse as is expressed in the words; "It's the proper thing to do". In the second place our membership consists overwhelmingly of men who are actively engaged in agricultural work either in their own lands or in the Agricultural Department. It is I believe our duty to see that our membership does not become diluted by a large proportion of men whose interest in agriculture is confined to the collection of rentals after the harvest. In the third place there is no reason why we should not be able to have a very definite programme of work and I take it that one of the most important functions which this meeting can perform is to map out a definite line of work for our members.

May I be permitted to make a few suggestions with regard to the character of that work. The name of our association implies something more than mere agricultural propagandis work. It implies that its members are to be associated in an endeavour to find out what real definite improvements can be made in the production of individual crops and of individual kinds of live-stock. In other words, one of the chief functions of this union should, I think, be to amplify and extend the experimental work done by the agricultural department.

That an extension of the experimental activities of the department is required must, I think, be clear to all of you and undoubtedly a considerable demand has arisen in the State for such extension. Hardly a meeting of the Representative Assembly passes without requests being presented for the opening of more experimental farms. Probably the distinction between experiment and demonstration is not very clear in the minds of some of the petitioners but undoubtedly underlying these requests is the feeling on the part of agriculturists of the State that before they adopt any supposed improvement whether of seed, cultivation or manuring on their own lands they want it tried under careful supervision in their own immediate neighbourhood. There is much sound reason in this. A definite result may be obtained from a certain variety of seed or a certain method of cultivation on the Hebbal Farm but we cannot predict with certainty that the same result will be obtained with the same seed or the same method of cultivation at, say Tumkur. The Department has, it is true, a very large number of co-operators all over the State who are constantly trying the improvements suggested by us. Some of these co-operators are among the most valuable members, of this Union and others will undoubtedly join but in the case of many of them it would, I believe, be unwise to base any general conclusions on the results of their trials simply because they are satisfied to feel that a certain suggested improvement has been advantageous but are not in a position to say to what extent it has benefited them.

I was visiting the Agricultural Department in Washington some years ago, at the time when the question of inoculating

the seeds of leguminous crops with a culture of root nodule bacteria was attracting much attention. The Department had for some years been sending out what purported to be active cultures of these bacteria for this inoculation work. Letters had been received from thousands of American farmers testifying to the beneficial results of these cultures on crops such as clover and lucerne and yet it has since been quite clearly shown that the cultures sent out in a very great majority of cases could not possibly have been of any use whatever. Here then was a supposed agricultural improvement introduced by the most powerful agricultural department in the world heralded far and wide by the newspapers of the country as a scientific discovery of the greatest practical importance, and testified to by thousands of farmers all over the country and yet it was no improvement at all and probably did not add a thousand dollars to the wealth of the country. We do not want a similar thing to happen in Mysore and if we are to avoid it, we must have not only the most careful experimental work carried out by the Agricultural Department itself but we must have this work most carefully checked and tested under the varied conditions of soil and climate which we find in the State.

If enough money and a sufficiently large staff were available these local experimental checks could be applied by the Department itself but neither of these conditions exist. We must then turn to men who are actively engaged in agriculture and who have the energy, the ability and the integrity to apply these experimental checks on their own lands and are prepared to furnish as accurate results as it is possible to obtain. I need hardly point out that such results will be just as valuable when they are at variance with those obtained by the Department as they will be when they agree. In other words, we need real results supported by actual figures and not haphazard suppositions. A statement that a certain manure has doubled the yield of a certain crop is, in my opinion, useless unless it is supported by actual figures. I fear that in too many cases the estimates of increase due to a certain supposed improvement which has been introduced have no more basis in fact than have many of the estimates of agricultural production with which we have become familiar. To base

agricultural improvement in the State on the unsound foundation of guess work is a very hazardous proceeding indeed.

Enough has been said of the need there is for a body of intelligent and energetic agriculturists in the State who will co-operate with the Department in obtaining accurate results with regard to supposed agricultural improvements. I shall turn now to some of the lines along which we are in urgent need of information.

Let us first of all consider improved implements and take up the question of ploughs. I think there remains no doubt in the mind of any ryot who has had experience that the improved plough is a more efficient and better implement at least for dry land cultivation than is the country plough. This is not enough, however. We should have accurate information as to the comparative cost of cultivation with improved and country ploughs on all kinds of soils and in all the districts of the State. Such estimates should take into consideration depreciation and repair charges and should be based on accounts kept for a full ploughing season. They should not be based on the results of a few hours' work. This information is not yet available. Every member of this Union who is cultivating his own land should be able to furnish information of great value on this point.

We have also a number of different types of improved ploughs. Let us take two—the Kolar Mission Plough and the Bar Share Plough. These are of about equal size and are intended for the same type of work. Comparatively large numbers of both are in use and yet we have little really accurate information with regard to the relative merits of the two types. We know on the one hand that the Bar Share Plough is heavier than the Kolar Mission Plough and is also somewhat heavier in draught; on the other hand it appears certain that replacements and depreciation are less in the case of the former plough. Their action on different types of soil is known in a general way but little information based on actual accounts is available. This is a matter of great importance for, I am convinced that we have not yet reached the type of plough best suited to our red soil

conditions. Every bit of accurate information as to the relative merits of these two types will therefore be of great value. What applies to these two types of ploughs, applies also to the heavier types which have been introduced on the black soil areas, to lighter ploughs used in the western part of the State, to cultivators and other agricultural implements which have been introduced. Here is an absolutely straightforward field for experiment where accurate information can be readily collected which should prove of the greatest value to the agriculture of the State.

If we turn to seeds of important crops, we have as you are aware been introducing certain improved strains of ragi and hope to extend this work rapidly. Of the three strains which have been introduced on a fairly large scale this year it is highly probable that one will do better in one district or taluk and another in another. It is quite possible that in some localities one of them will do as well as the varieties already being grown. It is quite necessary that we should have accurate information with regard to relative yields under the most varied conditions of soil and climate in the case of all new strains of crops and it is perhaps in this direction that the members of the Union can do most useful work. Breeding work on ragi, sugar-cane, cotton and castor is at present being carried out and seed of new strains of all these crops should be available at least in small quantities for members next season. I trust that members will be prepared to carry out carefully controlled experiments on all these crops and will be able to furnish accurate data not only as regards yield but also as regards soil, rainfall, cultivation and manuring so that we may know the conditions under which they were grown.

With regard to cultivation and manuring let us consider sugar-cane. As you will see on the Hebbal Farm, we are at present carrying out experiments on the application of oil cake to sugar-cane and on the distance apart of planting. Both of these are of great importance, and we have already obtained pretty accurate results as far as our conditions at Hebbal are concerned. We know that under ordinary conditions an application of two

tons of castor or honkey cake per acre to cane is more profitable than a one-ton application. There are indications that a three-ton dose is still more profitable. These results should be checked by members of the Union growing sugar-cane. It is not necessary to spend large sums of money on such tests for they can be carried out on quite small plots.

With regard to distance apart of planting we find that rows three feet apart give a higher yield than rows two feet or one foot apart. Rows four feet apart seem to give still better results. The importance of this from the standpoint of saving seed and of substituting cultivation and weeding with bullocks for cultivation and weeding by hand can hardly be overestimated. The extension of sugar-cane cultivation in some parts of the State is directly dependent upon the possibility of substituting bullock for hand labour. Do our results apply to such regions? Experiment alone will show us.

I might multiply the instances of items of work in which members of the Union can and should do useful work almost to infinity. If you do not help the Department, its recommendations will have to be introduced tentatively and slowly for fear of making mistakes. With your co-operation we should be able to make rapid progress. You may perhaps gather from my remarks that I wish you to turn your estates into experimental farms. Nothing is farther from my thoughts and I may say nothing could be more fatal to your success. Testing work should be restricted to a very few problems and confined to a very small area. Your main business after all is to make money, not to carry on experiments.

Before concluding, I should like to draw your attention to a line of agricultural investigation which you can carry out much better than the Agricultural Department can at present. On none of our farms are we at present attempting how an estate should be run to make the most money. We have to tackle a large number of separate problems connected with all the main crops of the State and this necessitates working with a large number of small plots. An experimental farm is one of the last places on which to search for practical instruction in agricultural economics. This phase of agricultural investigation is however

one of paramount importance and such investigations must in the main be carried out on farms which are being worked solely for the profit of the owner. The keeping of accurate farm accounts and the interpretation of the results of those accounts is a line of investigation which you should make peculiarly your own and I should suggest the formation of small committee to draw up a standard set of account forms which should be used by all our members engaged in agriculture on their own lands. If such standardized accounts were kept, we should, in the course of a few years, have very valuable information with regard to the financial possibilities of agriculture in the State. That the keeping of such accounts would be of great benefit to the members directly concerned goes without saying.

Now, gentlemen, I have suggested only a few of the lines of investigation. An immense amount of propagandist and educational work is required in Mysore before our agriculturists reach a stage of enlightenment which will put them on a level with agriculturists in other parts of the world. Such propagandist and educational work should, I think, form an important phase of our activities. In fact, all important questions which affect agriculture may, with justice, be considered to belong to us. I think, however, that in the early stages of our growth as a union it would be wise if we restricted our energies to a comparatively small number of problems which are most insistently calling for solution. If we do not do this we shall be in serious danger of spreading our work out so thin as to make it entirely ineffectual.

The Kolar Mission Tamarind and Soapnut Plantation, Rollinspur Farm, Yedrur, Srinivasapur Taluk.

BY

Rev. Wm. H. Hollister, Kolar.

AT present we have 1,321 Tamarind (*Tamarindus Indica*) and 90 Soapnut (*acacia concinna*) trees growing in an area of 163 acres. These were planted in October 1894. As there are quite a number of honkey trees growing in the same tract we cannot state the exact number of acres in Tamarind and Soapnut trees.

I. Soil best suited for a Tamarind Orchard.

Red soil, a mixture of black and red, gravelly or slightly stony soil, and red soil mixed with sand seem to be well adapted to the growing of tamarinds.

II. Preparing Pits for Tamarind Trees.

Pits about a cubic yard in size and at intervals of 18 yards in both directions should be dug about six months before setting out the young trees. They should remain open to sun and air for a period of four months, after which they may be filled with prickly-pears (*Nagadaly*) or else with rubbish bushes, that will keep the bottom soil moist and serve as a fertilizer at the same time. The prickly-pears should be filled into the hole and crushed with a big wooden pounder, after which the same earth that was taken out should be used to refill and that about 2 months before the plants are set out so that the earth may settle in the pits.

III. The Nursery for Tamarind Plants.

Seeds should be selected from the choicest trees only, those which yield the best full rounded pods each year. These seeds should be removed from the pods at least six months before planting in the nursery. Any seeds found to have worm holes in them should not be planted.

The best place for a nursery is near a well or pond of sweet water (avoid brackish water or a rat-infested place). First dig a trench 4 feet wide $1\frac{1}{2}$ feet deep and as long as may be needed. A

series of short trenches is more desirable as it will be necessary to carefully fence in this bed, of tender plants. Get large size country tiles (potter's) from 12 to 15 inches in length the two halves still united in the shape of a cylinder. Place these cylinders in the trenches, wide part up narrow end down, leaving just a little space in either direction.

Broken bits of tile should be placed in the trench beneath the cylinder tiles to prevent the roots of the plants from going into the ground below which would cause injury to them when removing from the nursery.

Within the cylinder tiles the following mixture of soils should be placed; $\frac{3}{4}$ red earth, $\frac{1}{4}$ sand, $\frac{1}{4}$ ant-hill earth, and $\frac{1}{4}$ manure. One should be careful not to use too much manure or too fresh or manure worms will destroy these plants in the nursery.

Let the same earth that was taken from the trenches be used to fill the space between the tiles.

Place two well-selected seeds in each tile a little apart from each other. If one or both fail to grow replace them with other seeds. Let these plants grow for 8 or 9 months before transplanting to the large pits in the field.

IV. The Season for setting out the Plants.

Experience tells us that September and October are the best months in which to transfer the young plants to the pits. At this time there are continuous and gentle rains, and besides the cool cloudy weather gives the plants the best chance to take root.

In removing from the nursery carefully take up the cylinder tiles containing the plants; carry them in baskets to the pits; set the tile in place just where the plant is to stand and then tap tile sufficiently to split it in half. Carefully press earth around the parts and then remove the halves slowly pressing the earth around the plant gently as you do so, thus the tender rootlets will be undisturbed in the process.

If both plants in the pit are successful remove one of them, as two together never do well. In the absence of rain each

plant should have a $\frac{1}{4}$ pot of water once in two days, increasing later to $\frac{1}{2}$ pot each until the rains of the following year set in.

We have found it helpful to the young trees to plant prickly-pears around them for they serve as a protection against animals and in keeping moisture near the plant. We cannot explain fully how it is but the trees treated thus are the most flourishing and the first to bear fruit.

V. The Cultivation of the Orchard.

Constant tilling of the soil between the trees is beneficial. Thus, weeds are exterminated, the air gets in, moisture is retained for the trees. One may plant gram, samay or other grains for a dry crop which will help towards the cost of developing the orchard.

Should the field be a sloping one it is good to make bunds about 3 feet from the tree. It will help to retain the rain-water. The time required till the trees yield fruit in any quantity is from 15 to 18 years. Meanwhile, how can one derive some income from the land? Grafted mango-trees planted between the rows of tamarinds will yield fruit within four years, continuing increasingly to do so till the tamarinds begin to yield, thus helping to recover expenses, labour, kandayam and other costs.

The following measurements of the height and girth of the trees will give readers an idea of the growth of the trees during this period. The measurements were taken last year.

TABLE.

Class		I	II	III	IV	V
		12"-16"	10"	8"	6"	4"
No. of trees	...	323	244	238	252	245
Height	...	45'-50'	40'-45'	30'-40'	25'-30'	20'-25'

VI. Soapnut Plants.

The pits, nursery treatment and soil should be quite the same for soapnut plants as for tamarinds. It is better however to plant them around the border of the tamarind orchard where there are border trees up which they may climb. Otherwise pandals should be fixed for them to creep over. for without such support soapnut plants do not grow flourishingly. If they are left on the ground, the heat of the ground and the white-ants will greatly hinder their growth. A permanent bund in the shape of a half-circle should be made around each plant to catch the rain water. It might be well to caution against using the Bagi-Mara (*Albizzia Lebbeck*) as a support, as this kind is hurtful to soapnuts.

VII. The Income from these Orchards.

Since 1913 we have kept some record of the income from these trees. In these seven years four showed good results and three only half crops owing to drought. 1918 and 1919 have been especially poor years in the yield because of the dry years. The average income for the seven years has been Rs. 215 per year. This may seem very little for the number of acres planted but one must bear in mind that this was an experimental orchard; that nearly half of the tamarinds, being planted in bad soil, are in very poor condition, and have not yielded anything as yet. However, we are not discouraged, and we gladly offer the result of our experience so that others may avoid the mistakes which we have made. The price of a good orchard is constant vigilance and hard work but we are satisfied that this part of the Mysore State is well adapted to the culture of tamarind and soapnut trees and that much land that is now barren jungle should be claimed for such orchards.

A Brief Account of the Milk-selling Co-operative Society, Hebbal.

BY

T. Rangasami,
Dairy Inspector, Hebbal.

EARLY in the year 1918, one day the people of Hebbal were called together with a view to organize a branch milk society in connection with the City milk supply scheme proposed by the Department of Agriculture in Mysore. Many people appreciated the idea and it was unanimously agreed to start a branch depot. But when it came to business, the leaders dropped off one after another until at last only four gentlemen remained and these also were about to follow suit. It was a really hard task to persuade them to stick on and persistent inducements encouraged them to start the business on a small scale.

So the business was started on the 1st October 1918 with a subscribed capital of Rs. 400 (in four shares of a hundred each). After making necessary arrangements for housing the live-stock, the members purchased 3 buffaloes to start with. The number was gradually increased and by the end of June 1919 there were no less than 12 animals. By way of encouragement, the Government Dairy at Hebbal purchased all the milk which the Society could supply and gave timely help and advice.

The members worked by turns with great zeal and earnestness throughout the period and maintained all the accounts in the methods prescribed. The accounts of the Society for a period of 9 months (from 1st October 1918 to the end of June 1919) were audited on the 12th September 1919 and the balance sheet drawn up showed a net profit of Rs. 747 as detailed below :—

Receipts from 1st October 1918 to 30th June 1919.

		Rs.	A.	P.
1. Subscribed amount	...	400	0	0
2. Loans taken on different occasions	...	405	0	0
3. Amount realised by the sale of milk	...	1,552	0	7
4. Sale of one milk can	...	2	8	0
5. Sale of one buffalo	...	50	0	0
Total ...		2,409	8	7

Expenditure.

		Rs.	A.	P.
1.	Purchase of 12 buffaloes ...	650	8	0
2.	Do Straw ...	364	5	6
3.	Do Concentrates ...	346	15	1
4.	Salary of servants ...	172	6	0
5.	Paid for outside milk purchased ...	317	2	3
6.	House building and repairing ...	437	1	1
7.	Interest on Rs. 405 at 12% ...	27	2	0
8.	Advance given to servants ...	85	0	0
9.	Cash on hand on 30th June 1919 ...	9	0	8
Total ...		2,409	8	7

Out of the profits derived, the members purchased a house with open yards both in front and behind. This could accommodate 22 buffaloes. Some improvements in the flooring and roofing of the cattle shed were also effected after purchasing the house.

No sooner did the members who had originally dropped off come to know that the business was working at a profit, than they (most of them) volunteered to be enrolled again as members. This necessitated calling a general meeting which was held on the 23rd September, 1919. Thirty-seven gentlemen attended this meeting and all of them became members. The starting of a new Dairy Society was thought of after collecting enough funds by way of shares and deposits. But it was soon found that the collection of funds for the purchase of milch cattle would take time. Hence it was decided to buy up the concern already running even against the wishes of the persevering four pioneers. After due valuation of all the articles in the Society's premises, the buffaloes, the house and almost everything, it was decided to buy up the Society for Rs. 1,560. It was agreed that the amount should be paid up in monthly instalments. The business was taken over and the present Society has been managing it since 1st October 1919. There are in all 42 members on the rolls and it is expected that many more men from the neighbouring villages will take advantage of the Society in the near future. Application was made to

the Registrar of Co-operative Societies for registering this Society in December 1919 and no reply has been received yet.

It is needless to point out the difficulties met with and the great efforts made to persuade cow-keepers to change the time of milking both morning and evening (5 o'clock in the morning and 2 p.m. afternoon) to facilitate the timely supply of fresh and good milk to customers living at a distance. It is gratifying to note that one after another, the cow-keepers are changing the time of milking to suit the convenience of the Society and a certain amount of confidence has also been created amongst members. Some of the enthusiastic members are increasing the number of milch cattle in their houses and supplying all the production to the Society. It is now being arranged to bring the animals to the Society's premises at the time of milking and to have them milked there.

Turning now to the working condition of the Society which was purchased, the following account will be of interest:—The original Society was taken over on the 1st October 1919 with 11 buffaloes out of which only four were in milk, and one calved in the middle of November 1919. Besides the milk obtainable from these buffaloes it was arranged to purchase more milk from members who agreed to milk at the required time and in the presence of the Society's men, at a uniform rate of $4\frac{3}{4}$ seers a rupee and to sell at $4\frac{1}{4}$ seers a rupee, gaining thereby half a seer or one anna ten pies for every rupee worth of milk purchased.

*Statement of receipts and expenditure for the 1st three months.
(1st Oct. to 31st. Dec. 1919.)*

Receipts.

	Rs.	A.	P.
1. Share amount collected from members.	211	8	0
2. Share fee do ...	15	8	0
3. Admission fee do ...	21	0	0
4. Amount realised by selling milk ...	1,194	8	5
Total ...	1,442	8	5

Expenditure.

	Rs.	A.	P.
1. Paid for outside milk purchased ...	859	5	10
2. Purchase of straw ...	100	3	0
3. Purchase of bran, cake, etc. ...	43	5	0
4. Salary of 2 servants for 3 months	40	0	0
5. Miscellaneous expenditure ...	24	15	3
6. Paid towards the loan (purchase of dairy buildings, etc.) ...	370	0	0
7. Cash in hand on 31st December ...	4	11	4
Total ...	1,442	8	5

It can be seen from the above that a net profit of Rs. 126-11-4 was realised (excluding share fees, share amount, and admission fee) during the short period of 3 months. Depreciation on live-stock has been set off against the value of manure and the calves. It is necessary to state here that one of the conditions made between the party who sold out the business and the Society was that no interest should be paid for the first six months and 6% per annum to be paid on the remaining amount after the expiry of the date.

In concluding this account of a venture, it is earnestly desired that many more enthusiastic men of different localities will organize similar branch societies such as ours round about Bangalore with a central depot in the City to receive the supplies from all the branch societies and to arrange to sell and deliver good and fresh milk at the very doors of customers.

H. 22 Ragi in Shimoga.

Dr. Coleman writes to us :—

I have received a letter from Mr. C. Subba Rao of Shimoga, one of the members of our Union, regarding the results of a trial at Shimoga of our new ragi, Hebbal-22 which is commonly called Maddayangiri. The information contained is of general interest and I take the liberty of quoting from the letter. Mr. Subba Rao states as follows :—

“I measured a plot 50 feet square or 2,500 square feet in both the Maddayangiri (Hebbal-22) and the local ragi plot. Although the local variety appeared more flourishing than Hebbal-22 on account of the short and compact character of the spikes, in the final result the yield of Hebbal-22 was more than that of the local variety.

I observed another difference between these two varieties. The local variety can be easily threshed and the grain separated with little difficulty whereas Hebbal-22 requires more labour for threshing. Another important difference I noted lies in the fact that in the local variety when the crop is ripe if there is a shower of rain the grains drop to the ground. The heads themselves also retain moisture and this leads to the spoiling of the grain. On the other hand in Hebbal-22 the spikes growing well separated from each other no water is retained in the heads and the grain does not shed. If the heads of this variety are broken off and drop to the ground they can still be harvested whereas in the local variety this cannot be done.

The local grain from the plot measured 56 seers, whereas Hebbal-22 gave a yield of 60 seers. Calculating for an acre this gives a yield of 976 seers for the local variety and 1,045 seers for Hebbal-22. The straw from the local plot weighed 286 lbs. and that from the Hebbal-22 plot weighed 327 lbs.”

While the figures for comparative yield given by Mr. Subba Rao are interesting, he points out another very great advantage which must have come to the attention of many who have tested this ragi during the past season. That advantage lies in its freedom from shedding. On account of heavy rains at the

harvest season growers of the usual local varieties have suffered very heavily this last year. One reliable landholder estimated his loss at 75% of the total from shedding alone. The importance of introducing a non-shedding variety must therefore be obvious to all and in this respect our new variety Hebbal-22 is undoubtedly a very great improvement over the ordinary varieties commonly grown in the State.

Parasitic Plants as Enemies to Crops

BY

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PARASITIC plants are those which take their nourishment from other plants. This interesting class of plants has still many points of its life history, on which much light has not been thrown, and consequently has been regarded as a botanical freak. There are instances in which these interesting plants have begun to cause a lot of trouble to cultivators, by attacking some of the important crops. The object of this paper is more to give an idea of some of such troublesome plants, than to detail out any experiments in the line of eradicating them.

Before taking specific instances of parasitic plants attacking crops in Mysore, let me give a short description of the habit of parasitic plants in general. These take from their host plants a lot of nutritious matter, such as starch, cellulose, proteids, and tannin, in addition to water. Some are only partial parasites, others complete parasites depending entirely on the elaborated food-stuff taken from the host plant. Parasites may be divided into two sorts according to their mode of attack. There are those which, like armies in modern warfare, are in the habit of making subterranean attacks. The roots of the parasites develop special structures or haustoria by which they take nourishment from the roots of the host. Others there are which are quite open in their attack on the stem and the leaves of the host plants, forming haustoria at short intervals. The

effect on the host plant on account of this parasitic attack is, that the plant suffers from a considerable loss of vigour, and consequently the yield is very much reduced. Some of the important parasitic plants in Mysore are described here.

Striga Lutea is a small parasitic herb, with yellow or white flowers, and very tiny black seeds. It commonly attacks Ragi, Jola, and Sugar-cane, and can be seen on the field bunds in intimate association with grass. The parasite abounds in fairly large numbers, and begins to set seed about the time of the harvest of the crop it attacks. The seeds thus shed on the ground serve the purpose of attacking a future crop of Jola, or Ragi.

Any attempt at eradication of the pest must lie in the direction of preventing the parasite from setting seed. Weeding out the parasite, of course, involves not only considerable amount of labour, but the risk of injuring the roots of the crop. Experiments are under way to see if a rotation of crop will serve to check the parasite since it is well known that *Striga* has a considerable partiality for members of the grass family.

Among other root parasites, which are often likely to assume a serious form of attack, may be mentioned *Balanophora* on coffee. This is a complete parasite depending entirely on the host plant. The parasite does not make its presence known till the time of its flowering, when it emerges out of the ground as a club-shaped body.

Sporadic attacks of a root parasite with an identical habit as the above, have been reported on tobacco. This is the *Orobanche* with a long cylindrical inflorescence, described in a previous number of this Journal.

I cannot but make a passing mention of the rôle of sandal as an enemy to crops. The length to which sandal roots travel in the ground in search of host roots and the avidity with which it feeds on these, are well known facts. Even roots of its own kind are not spared, as the condition of some of our closely-packed forest plantations will testify. This reminds me of a coffee planter, who, when he was shown a section of sandal haustoria actually breaking up the roots of grass and bamboo into pieces, said that he would take care to protect his coffee

plants from such ravages in spite of the fact that sandal forms a Government monopoly.

The gentler method of the ryot in disposing of sandal from his field by growing a crop of castor is still to be tested.

Among stem parasites, may be mentioned *Loranthus* on mango trees. All along the stem can be seen large masses of haustoria or the feeding organs, so that in course of time, there seems to be more growth of the parasite than mango shoots. The condition of the avenue trees along the Hosadurga Road is quite in evidence of the ravages of this parasite. The only way to keep it in check is by knocking down the haustoria of the parasite.

A casuarina plantation near Malur showed a number of *Viscum* attacking all over the stem, with the result that some of the trees were dead.

An extreme case of parasitism can be seen in the Dodder, (*Cuscuta*) and cassytha, which are composed of thin yellow threads coiling round the stem and the leaves and drawing nourishment through the haustoria. These parasites are occasionally found on *Avare* and *Ragi*, as well as on *Acacia* plants near the fields.

NOTES AND COMMENTS

BY THE EDITOR

Experiments by Members.

THE attention of members is invited to the scheme of experiments recommended to them for the ensuing crop season. We hope every one of our members will find it convenient to undertake at least one out of the number recommended. Such work will really form the *raison d'être* for an association of this kind. Under the name of "Co-operative Experiments in Agriculture" similar work is being carried on in Canada for several years by the Canadian Agricultural and Experimental Union where the experiments are more numerous and varied and the work has been productive of much good. It is an excellent example to copy and we trust the small beginning we are making will grow. •

Passed Agricultural Students for Employment on Private Estates.

We are glad to note that a demand is springing up for the services of men trained in Agriculture for the management of private estates. We have been in receipt of three such applications from large estate owners in the State. The attention of passed students of the Hebbal Agricultural School is drawn to the advertisement appearing elsewhere in this number of the Journal and also to the circular issued by the Director of Agriculture regarding registration of the names of applicants.

The Use of Oil-cake and Animal Refuse as Manure in Ancient India.

Those of us to whom the sanction of ancient custom is a

powerful guide to action will be interested to read the following passages from Sukraniti :—

If trees have their fruits destroyed the pouring of cold water after being cooked together with Kulutha, Masa, Mudga (pulse), Yava (barley) and tila (gingelli seed) would lead to the growth of flowers and fruits. (Stanzas 107-108, Chapter IV, Section IV.)

The growth of trees can be helped by the application of water with which fishes are washed and cleaned. (Stanza 109 *ibid.*).

The King should nourish plants by the excreta of sheep, goats and cows, water as well as meat. (Stanza 94 *ibid.*).

The powder of the excreta of goats and sheep, the powder of barley, tila, beef as well as water should be kept together for seven nights. The application of this water leads very much to the growth of flowers and fruits of all trees. (Stanzas 110—112 *ibid.*).

It will be seen therefore that the recommendations of Agricultural Departments in regard to the use of oil-cakes, of fish manure, dried blood, flesh and bone meal is but an elaboration of the precepts of Sukraniti.

* * *

The Use of Salt as Manure.

Whether the use of common salt as a manure for crops can be safely recommended is a point on which there is difference of opinion. It is however true that in the case of some crops at least it is commonly believed that the use of salt is beneficial. In certain parts of the Bombay Presidency ryots regard the use of salt as indispensable to certain crops which they accordingly manure regularly with this material. The Government of Bombay has for some years been helping these ryots to obtain salt for manurial purposes at concession rates, the salt so sold being denatured or rendered unfit for human consumption by being mixed with some evil smelling adulterant. Leaflet No. 8 of 1919 issued by the Bombay Department of Agriculture describes the arrangement made for supplying such salt to ryots and also

gives the following details regarding the crops for which it can be used with advantage and the quantities to be applied :—

Name of crop.	Quantity to be applied.	Time of application.
(1) Cocanut	2 to 4 lbs. per tree according to the age of the tree	August to September.
(2) Mango	4 to 10 lbs. per tree according to the age of the tree	
(3) Paddy	400 to 800 lbs. per acre	After the harvest of the rice crop.

These directions apply to the Konkan tract where the main rainy season is the south-west monsoon.

* * *

Land for the Landless.

The anxiety on the part of the State to settle people on the land has been a very prominent feature of the agricultural policy of the Government in Great Britain during the past two years. The object has primarily been to satisfy the demand on the part of ex-army men returning to civil employment to be provided with small areas of arable land on which they could settle as farmers and in regard to which Government had committed itself by definite promise. There was secondly the feeling that the arable land in the country was not being farmed to the best advantage of the nation and that the remedy lay in the taking over by the State of land under private ownership, and parceling them out as small holdings or self-contained small farms to be let out to small farmers. Great progress has been made in England in the acquisition of land by the State for this purpose and we read that till October 1919 an area of 105,000 acres had been so acquired and that a further 93,000 acres were being negotiated for. The Government is also taking steps to provide these holdings with buildings and other equipment, with cheap capital, transport facilities and a business organisation for the purpose of co-operative buying and selling.

The small holdings are however not the only form of land settlement; and two interesting novel settlements have also been

formed in which the settler becomes a profit-sharing partner along with his fellow settlers in the colony. Two of these are described below and will no doubt be found interesting :—

“ Farm Settlements.—The Board themselves were authorised by the small holdings (Colonies Act, 1916,) to acquire not more than 6,000 acres in England and Wales for the establishment of co-operative settlements on the lines recommended by the Verney Committee which reported in January (Cd. 8182). The whole area authorised was acquired in 1916 and 1917, and by the Amending Act of 1918 the area authorised to be acquired was increased to 60,000 acres. Up to the present ten estates have been acquired, comprising 18,600 acres, and active negotiations are in progress for the acquisition of an additional 10,000 acres.

These settlements are being developed either as small holdings, colonies or as big profit-sharing farms. In the latter case, as at Partington in Yorkshire, the land is farmed as a whole by a Director, the settlers have their own cottages with half an acre of garden, they are employed on the farm at the District rate of wage, and, after a preliminary period of probation, they are entitled to a share in the profits made from farming the land. The profits, after paying 5 per cent interest on the farming capital and the working expenses of the farm, including rent, rates, repairs, and other annual charges, and after allocating a percentage to a reserve fund, are divided between capital, management, and labour in proportion to the amounts paid out to them in the working account. In other words the settlers receive dividends on the amount of their wages for the year. For the 18 months ended 30th September, 1918, a period which includes two harvests, the net profit on the Partington Settlement of 2,300 acres was £11,685 and the share of profits due to the settlers amounted to a dividend of over 50 per cent on their wages.

The other type of settlement may be illustrated by the one at Holbeach in Lincolnshire. Here the Board have leased from the Crown 1,000 acres of first-class agricultural land. It is specially suited for market garden small holdings, and it is being

developed to provide some 70 small holdings of 5 acres each in the first instance, to be increased to 10 acres as the men find their feet. The remainder of the estate will be retained as a central farm under the control of the Director, whose advice and assistance will be available for the small holders both as regards the cultivation of their holdings and the co-operative organisation of facilities for the purchase of their requirements and the sale of their produce. The settlers will also be able to obtain on hire from the central farm the use of horses and the more expensive farm machinery, and will be able to supplement their earnings by working on the central farm at certain seasons. Fifty-four new cottages have been erected on this estate, and 10 more will be built. The cottages are let to the settlers at £10 a year, and they pay a rent of £2-10s. an acre for their land.”—*From the Journal of the Board of Agriculture, October 1919.*

We may note in this connection that nearer home also the state has evinced a disposition to grant land to the landless, though this may be for reasons not quite the same as in the cases we have been describing. The Government of Madras have lately come to the rescue of the poor men especially of the depressed classes who however eager they may be to possess some land of their own, never get a chance where they have to compete with their wealthier brethren for Government waste land auctioned for cultivation. The Government have also provided against the possibility of the land so granted to these men passing from out of their lands into those of wealthier people, a contingency which otherwise would happen only too often.

THE
Mysore Agricultural and Experimental Union.

EXPERIMENTS FOR THE CROP SEASON
1920-21.

Agricultural Experiments for the Crop Season 1920-21.

The Mysore Agricultural and Experimental Union desire to arrange with its members for a series of experiments on improvements connected with Agriculture. The following is a list of the Experiments which it is proposed to carry out:—

Experiments with Implements.

1. Testing of the Verity, the Kirloskar, Kolar Mission, the Syracuse, the P. W. D. Bar Share Plough, the Eureka Plough and the Meston Plough to ascertain the cost of ploughing per acre with these ploughs as compared with ploughing with a country plough.

2. Testing of a new model of Bar Share Plough designed by the Agricultural Engineer to ascertain its suitability for red soils and its weak points, if any. Through arrangement with the Agricultural Department ploughs will be supplied free of charges to intending experimenters on the understanding that—

(a) They shall be used through one ploughing season and shall be used for ploughing not less than 5 acres of land, and

(b) That they shall be returned to the Department at the end of the ploughing season. Carriage charges to be borne by the Department both to and from.

Experiments with Seeds.

1. Testing any two new varieties of sugar-cane; seed enough for one gunta of each variety will be supplied.

2. Testing any two new varieties of ragi; seed enough for $\frac{1}{2}$ an acre of each variety will be supplied.

3. Testing any two of new varieties of castor.

4. Testing any one of Dodda Hatti Cotton; seed enough for $\frac{1}{10}$ an acre will be supplied.

4. (a) Testing any one of new varieties of Sannahatti cotton; seed enough for $\frac{1}{10}$ an acre will be supplied.

5. Testing any two of varieties of groundnut; seed enough for $\frac{1}{10}$ acre of each variety will be supplied.

Conditions of Supply of Seed.

The seed of each will be sown in two separate plots with check plots arranged as follows:—

.....
Check Plot
.....

Variety 1.
.....

Variety 2.
.....

Check Plot
.....

Variety 1.
.....

Variety 2.
.....

Check Plot
.....

Applications from members intending to undertake the experiments should be made to the Honorary Secretary, Mysore Agricultural and Experimental Union, Bangalore, specifying the particular experiment or experiments they desire to undertake.

LESLIE C. COLEMAN,

President, M.A. & E.U.

SELECTIONS.

The Sugar-cane Moth Borer.

This is a report of the present status of knowledge of *Diatraea saccharalis crambidodides*, based upon a review of the literature and investigations conducted by the authors over a period of years, together with technical descriptions of the larva and pupa stages by C. Heinrich.

It is shown that this form occurs in Florida as far north as Gainewville, in south-western Mississippi, in Southern Louisiana, and in the Rio Grande Valley in Texas in the vicinity of Brownsville.

Its only parasite of importance in the United States is *Trichogramma minuta*, which attacks the egg and is universally distributed in the sugar-cane fields of Louisiana and also in the Rio Grande Valley in Texas. Mention is made of a number of natural enemies which occur in foreign countries, including a Cuban tachinid (*Euzenillioptis diatraea*), introductions of which are being made into Louisiana. Experiments and observations on artificial control, which are presented in detail, have led to the following recommendations :

“Scraps of cane left about the factories and derricks, after the grinding season, should be destroyed by burning or otherwise. Cars in which canes were shipped, especially if they go into non-infested territory, should be kept free of such scraps. Seed cane should be planted in the fall, if possible, and kept as deeply covered as practicable. Extraordinarily deep planting is not advocated, but as borer moths fail to emerge from cane under more than 0.5 inch of compact soil, care should be taken to keep the seed cane well covered to that depth as a minimum. A heavy rain will sometimes wash the earth from the seed cane from one end of the row to the other, and in this case it is important to cover the cane again as soon as possible, especially in the spring when the moths are emerging.

“Cane for shipment to points beyond the infested area should be selected so as to obtain it sound and free of borers, or, if this is impossible, it should be soaked, previous to shipment, for at least an hour in Bordeaux mixture or a solution of nicotin sulphate.

"The 'trash' or 'sucks' left on the fields after cutting should not be burned, but should be lightly covered with earth in the fall and ploughed out in the spring. This practice has never been found to increase the borer infestation, and it has often diminished it. The soil is fertilized by the buried trash and its mechanical condition is greatly improved. Cutting out 'dead hearts' or dead plants and destroying them is theoretically sound, and with an abundance of cheap labor it might be recommended.

"The introduction of parasites of the moth borer from Cuba and other tropical countries is recommended."

—*T. E. Holloway and U. C. Loftin (Bull. of the Dept. of Agri., U. S. A., No. 746 of 1919.)*

An Indian Agricultural Society.

The Secretary of the U.P.A.S.I. has received from the Hon'ble Dewan Bahadur L. D. Swamikannu Pillai, I.S.O., Temporary Additional Secretary to the Government of Madras, Revenue (Special) Department, the following letter and enclosure, which, with his permission, we reproduce for the general information of all Planters, and, we shall be glad to learn what support the scheme will meet with from the planting community.

FORT ST. GEORGE,

5th December, 1919.

Sir,—The Government of India have recently been considering a scheme for the formation of an Indian Agricultural Society with objects generally similar to those of the Royal Agricultural Society of England. As you are aware, one of the results of the Reform Scheme will probably be to make agriculture a Transferred Subject, and, although it is proposed to maintain central institutes for purposes of research, agricultural development will, in the future, depend very largely upon Provincial initiative. In the altered conditions, it will be useful to form an organisation of a *quasi* non-official character at the Head Quarters of the Government of India, which will, by keeping in touch with the Government of India and by having branches in the provinces, be a co-ordinating link in agricultural development. The proposed Indian Society would not be affiliated to the Royal Agricultural Society in England, but the latter Society is in favour of the proposal, and would be prepared to furnish any information required and to give any assistance possible.

It has been suggested that Provincial Societies should be formed, with separate funds and organisation, and that there should be a Central Council, comprising: (a) A few nominated officials, (b) Governors and Members elected by the Provincial Society in proportion to their membership, and (c) Life Governors and Members elected by the Central Council. The Central Council might be financed by a small levy on the Provincial Societies and maintain a paid Secretary, and this Federation would then constitute the Indian Agricultural Society. The functions of the Central Council would be to co-ordinate the activities of Provincial Societies and advise them generally, and the objects of the Provincial Societies would be those indicated in the Provincial prospectus which forms an enclosure to this letter. It is believed that zamindars and landholders would welcome a scheme of this character, and would warmly support it.

I am to request that the Government of Madras may be favoured with the view of the Association, (i) on the proposal thus to form a non-official body or bodies whose function would be the encouragement of agricultural research and development, and (ii) on the suitability of the scheme outlined above. If possible, some indication may be given of the extent to which private endowments or benefactions and subscriptions for governorships and memberships are likely to be forthcoming in this Presidency. It is requested that a reply to this reference may be sent by the 15th January, 1920.

I have the honour to be, etc.,

L. D. SWAMIKANNU,

Temp. Addl. Secretary to Government.

Outline of Scheme for an Indian Agricultural Society.

CONSTITUTION.

Patron.—His Excellency the Viceroy.

Central Council.—Comprising:

Nominated Officials:—

Hon'ble Member, Revenue and Agriculture Department—

Chairman.

Secretary, Revenue and Agriculture Department—*Agricultural Adviser.*

Elected:—

Governors.

Members.

Branches to be organised in the provinces on similar lines, with the Head of Province as Provincial President.

Governors and Members elected by Provincial Societies to hold office on the Council for three years, one-third retiring each year.

Life Governors and Members of the Society to be elected in unlimited numbers at meetings of Council.

ANNUAL SUBSCRIPTIONS.

Governors	...	...	...	Rs. 75
Members	...	...	...	„ 15

Life Governors and Members may compound their annual subscriptions for Rs. 750 and Rs. 150, respectively.

Objects.

The general advancement of agriculture in India, and in particular:—

- (1) To embody and republish in the vernaculars such information contained in Agricultural publications, and in other scientific works, as has been proved by scientific experiment and practical experience to be useful to the cultivators of the soil;
- (2) To correspond with agricultural, horticultural and other scientific societies, both in India and abroad, and to select from such correspondence all information which, according to the opinion of the society, may be likely to lead to practical benefits in the cultivation of the soil. The correspondence with foreign societies will be the function of the Central Council, and the selection of information likely to be useful in its own provincial circle will rest with the local Societies;
- (3) To pay to any occupier of land, or other person who shall undertake, at the request of the society, to ascertain by any experiment how far such information leads to useful results in practice, a remuneration for any loss that he may incur by so doing;
- (4) To encourage the scientific study of the following matters, *viz*:—(a) The improvement of agricultural implements, (b) the construction of farm buildings, (c) the application of chemistry and manures to the general purposes of agriculture, (d) the destruction of insects injurious to vegetable life, (e) the eradication of noxious plants, and (f) the care and eradication of plant diseases;

- (5) To take measures for the improvement of the education of those who depend upon the cultivation of the soil for their support either by the establishment of model rural schools, both elementary and secondary, or by encouraging the production of trained teachers for such schools, or otherwise;
- (6) To take measures for developing the appreciation of veterinary science as applied to horses and agricultural stock;
- (7) At the meetings of the Society in the provinces, by the distribution of prizes and by other means, to encourage the best methods of cultivation, dairying and breeding live-stock;
- (8) To promote the comforts and welfare of labourers;
- (9) To encourage the re-grouping of scattered holdings, and the formation and maintenance of economic holdings;
- (10) To encourage the spread of co-operation among cultivators.

Methods.

Awarding medals, prizes, life memberships, certificates, scholarships and diplomas upon the results of annual examinations in agriculture. Publishing a journal giving the results of the Society's activities. Advising generally on all agricultural matters.

—*From the Planters' Chronicle, Vol. XIV, No. 52.*

“Back to the Land!”

But, last of all, I should like to see steps—strong steps—bold steps—taken to lure the population back to the land. The land, as I have pointed out, has been the nursery from which the industries of the country have drawn a virile population, which has invigorated them and given life to them. The nursery is pretty empty now, and there is no surplus population to spare. It is a weakness to the State; it is an impoverishment of the land, and steps ought to be taken, not merely to keep the population there, but to bring back labour to the soil. There is much to be done for the regeneration of rural life in England. Men have been drawn to foreign lands by placards on the wall with attractive pictures of what is awaiting them when they cross the flood. If we only keep the population on the land and bring others back there England will be a better placard

than any you can paste on her walls. We want more cottages, with land attached. I was appalled when I went to my native village a short time ago. I just rambled about the woods and the fields there, and I was appalled at the number of cottages that I remembered—I am getting on in years it is true; but still it is not so long ago in the life of a country—that are moss-grown and filled with brambles and briars instead of smiling children—everywhere. You want cottages with land attached. You want rural industries regenerated. In the old days we had little industries even in that village. They are gone. They provided employment for the women and for the children and the men when there was nothing special calling for their services on the farms. They helped to supply labour, to keep the people from going away. It was a cheer through the place to have the whirl of those wheels. When they stopped, life became more depressing in the villages, and the men—especially the young men—fled away. Well, when we get electrical power developed in the country—do you know that in some continental countries they milk the cows with electricity—(A Voice: “And in England”)—Yes, quite true, in the north of England, turning the lightning on to milk the cows. They will help to revive the rural life. You must make the villages attractive. It is all very well to say that is not business; it is business. The dullness of the villages is appalling. I was brought up in one. I should not like to begin again under those conditions. The oppressive dullness was appalling. It chased men away. Let us chase the dullness away and regenerate the old country life of England and make the country more attractive, as it is much healthier for brain and muscle and heart than the towns. It is the thing which, if a man has got it into his composition, enables him to bear the worst wear and tear of life—generations of what the country has poured into his veins—he has got the soil of England, of Scotland and of Wales with its eternal endurance warning every fibre of his nature, and he goes through all the troubles of life facing them. Get the people back to the land, to the resurrection of that life. Then you will find the country not a picturesque desolation, but England will be really a garden ringing with cheerful and contented life.—*From a speech delivered by the Rt. Hon. Mr. Lloyd George, Prime Minister of England.*

Salts and the Growth of Coastland Plants.

A large proportion of the cultivated land in the West Indies lies around the seacoast. On it we find cultivated sugar-cane, cotton and cocoanuts principally, and growing wild, down to the margin of the sea, a well-defined flora of salt-loving or salt-tolerating plants which botanists include under the general term of halophytes.

The soil in which these plants grow—not only the true halophytes but also the cultivated crops—must periodically become impregnated with salt. It may, therefore, prove interesting to consider the relation of salt to the growth of halophytes, and the cultivated crops mentioned.

The cocoanut forms an interesting study in this connexion, for this plant will tolerate considerable quantities of salt: and at the same time thrive equally well in its absence. The widespread belief that the cocoanut needs salt for its development is unfounded. Copeland states: 'I do not know of any good evidence that the cocoanut demands salt for its best development.....the cocoanut roots can indeed endure considerable salt.....but the fact that the cocoanut can endure salt-water is by no means a proof that it needs it.'

Cocoanut roots are peculiar. They have no root hairs. Water is absorbed through a small region behind the root-cap. According to Copeland, 'the cocoanut must be said to have a root system ill-adapted to the absorption of large quantities of water, but its structure enables it to endure saltiness and dryness which would be fatal to most other plants. Beach soil usually contains no salt, except in such minute quantities as chemical analysis will detect in all soils; but it sometimes happens, as a result of storms, that the beach is temporarily filled with sea-water. This would kill any plant with ordinary roots, but does the cocoanut practically no harm at all.'

Under conditions of drought the impermeable hypodermis or skin of the root approaches closer and closer to the tip, until if dryness is severe enough, it reaches the root-cap. Thus the roots can automatically check the absorption of water without dying. The roots under ordinary conditions will absorb salt solutions up to considerable concentrations, but their structure renders them safe against concentrations that are high enough to be toxic.

The amount of water that can be absorbed by the cocoanut is relatively great, and transpiration¹ in sunlight is very rapid. It is interesting to note here that recent investigations in England have shown that surprisingly high transpirations are characteristic of many halophytes. It has also been shown that red and purple leaves transpire more rapidly than green leaves. This is of particular interest in view of the various opinions that have been put forward with regard to the physiological role of anthocyan (red colouring matter) of plants. It will be remembered that the young leaves of the Seaside Grape (*Coccoloba uvifera*), a typical West Indian halophyte, are nearly always red or yellow.

Returning to the question of salt-solution in the soil, it has been indicated that the roots of the cocoanut, according to Copeland, protect themselves against high concentrations by means of the growth of the hypodermis. Now in most halophytes the arrangement is entirely different. According to Hill true halophytes, which require common salt for successful growth, can adapt themselves to alterations in concentration otherwise. This is affected by the root-hairs which can accommodate their internal osmotic pressure as the salinity of the soil-water falls in concentration and conversely, the root-hairs can raise their osmotic strength as the salinity of the surrounding soil water increases.* This result is of fundamental importance. It explains the reason how halophytes exist under constantly changing saline conditions. It shows that plants which are devoid of this capability must suffer and eventually die out under saline conditions.

The question now arises as to whether sugar-cane or cotton is adapted in any way physiologically to withstand alterations in the salinity of soil-solution. According to Harrison the soil water in the fertile parts of the Experimental Fields at the Botanic Gardens, British Guiana, contains in one acre, to a depth of 12 feet from the surface, about 43 tons of sodium chloride (common salt), as well as considerable but much smaller quantities of other salts.

In this connexion Harrison states: 'The marked alkalinity and the high content of salts of magnesium and sodium chloride of the ascending subsoil water act detrimentally on growing crops during

* Osmosis is the interchange of two fluids of different densities when separated by a porous membrane. In the case of root-hairs, osmosis takes place between the cell-sap, and soil solution through the porous membranes of the cytoplasm of the cell.

dry seasons, and may be the cause of much of the cessation of active growth, of the wilting and of the scorching of crops soon after the commencement of and during the dry season.'

On the authority of Maxwell, it is stated that in ordinary soils a percentage of sodium carbonate exceeding 0.15 per cent will prevent a normal growth of cane. In Porto Rico, Zerban, has found a combination of bicarbonic acid and chloride up to 0.4 per cent harmless. It appears that cane in its later stages of growth may stand a much higher quantity of salt without visible injury. It may be noted that an occasional flooding with seawater on many West Indian cane fields has been found actually beneficial; but, according to Prinsen Geerligs, this is due to the chemical effects on the soil rather than to any physiological action upon the cane itself.

As in the case of bicarbonic acid, the presence of nitrogen and calcium lessens the toxic action of common salt.

It is clear from Zerban's work in Porto Rico* that salt when present alone in large quantities (say 2 per cent) greatly lowers the yield of cane, and as well, has a most deleterious effect upon the composition of the juice.

Nevertheless it would appear that while chlorides are inimical to the growth of the sugar-cane, this plant can to some considerable extent adapt itself to grow in the presence of appreciable concentrations. No information is available concerning the physiological action of the root of this plant such as has been recorded with regard to the cocoanut and the true halophytes.

The facts given in regard to British Guiana point to the fact that salinity may arise from the subsoil as well as from high tides and storms—a point which Copeland appears to overlook in regard to the adaptability of the cocoanut.

We have referred to the effect of common salt upon the process of transpiration in halophytes. It is probable that an opposite effect is produced in the case of non-halophytes.

In regard to the former class, investigations described by T. H. Hill have shown that the aerial parts of halophytes can absorb both fresh and sea-water, and thus can take advantage of any rain, dew, or sea-water which may wet such regions. Halophytes can also absorb moisture from the atmosphere, and finally, during

* Zerban's figures are expressed in percentages and Harrison's in tons per acre, so that comparison is difficult.

drought, some parts of a plant can be kept alive at the expense of water in other parts. It is improbable that these characteristics occur in the case of the cocoanut and sugar-cane, except perhaps, in regard to the last mentioned feature.

Concerning photosynthesis, or the building up of carbohydrates by green leaves in sunlight, Palladin states that excess of salts in the soil has a retarding effect upon this process. Watering with sodium chloride solution caused development to cease in most plants (non-halophytes), through the checking of photosynthesis. It is also due to stomatal closure, caused by excess of salts. If the leaves are slightly wounded so as to facilitate entrance of carbon dioxide into the tissue, starch accumulates about the wound margins. True halophytes grow, though slowly, upon soils rich in salts, since their stomata do not close at all.

The main conclusions arrived at from the foregoing are information that the roots of plants that require common salt or may be subjected to salinity without injury, can adapt themselves physiologically to changing conditions of salinity. This is particularly true of halophytes; it is probably true of such a plant as the sugar-cane; it is certainly true of the cocoanut, which may be described as a facultative halophyte. As regards such plants as cotton and sweet potato, which are commonly seen cultivated on lands adjoining the sea, there is no available information. The effect of salt in maritime plants is not to reduce absorption and transpiration of water. In the case of non-maritime plants there is a distinct tendency to reduce absorption, transpiration, and photosynthesis. The effect of common salt is greatly modified by the presence of other substances in the soil-solution.—*The Agricultural News*, Vol. XVIII, No. 456.

Lime and Limestone for Soils.

It is very often difficult for firms to supply, or planters to get, sufficient quantities of burnt lime for the purposes of estates, owing to difficulties in preparing it during the monsoon, shortage of fuel, and so on. It has been suggested that, since in whatever form lime is added to the soil its physical effect is the same, and depends upon the lime combining with the carbon dioxide present in the soil to form bicarbonate of lime, a compound soluble in water, finely ground limestone might be used instead of burnt lime.

Slaked lime has the following advantages: It is a very finely divided dry powder, so that it can be easily broadcasted and

intimately mixed with the soil. It also assists in breaking up the organic matter present, liberating plant food in a form available to plants. On clay and heavy soils, slaked lime acts upon the insoluble silicates and phosphates, and sets free potash and phosphoric acid for the use of crops in a way which crushed limestone could never do.

Consequently slaked lime is the best form to use, but lime is often needed to neutralise the acidity of a soil and get it into a suitable condition for the activity of soil bacteria. In these cases, it is possible to use crushed limestone if it is of a suitable kind, and the use of this material is widespread on tea in Assam.

Great care must be taken, however, to see that limestone of a suitable kind is procured. Limestone deposits in India vary a great deal in composition, containing, in some cases, a high percentage of magnesium carbonate, silica, etc., and these are not regarded as of good quality from an agricultural point of view, and may even be detrimental. •

Also the limestone for agricultural purposes in the tropics must be very finely ground indeed, and should be of the fineness of flour, or Basic Slag. This must be insisted upon.

Different forms of lime do not contain equal quantities of actual oxide of calcium, which is the chemical compound being bought and used, and so it is necessary to apply them in different quantities to produce the same effect. The equivalent quantities by weight of pure material are as follows :—

Crushed limestone	...	... 100
Slaked lime	...	... 74
Quick lime	...	... 56

It will thus be necessary to replace a dressing of a ton an acre of slaked lime by $1\frac{1}{2}$ tons of crushed limestone, or even 2 tons if it is not of a high standard of purity.

It will thus be seen that it is largely a matter of cost. If crushed limestone of a suitable quality and fineness can be put on the market at such a rate, including transport, that two tons of it can be applied at the same cost as one ton of good slaked shell lime, we should certainly advise planters in many cases to use it, and most certainly to give it a trial. It is possible that this can and will be done. Experiments carried out a year or so ago in Coorg showed that it was possible, and the matter is just now being seriously looked into.—*Rudolph D. Anstead in the Planter's Chronicle, Vol. XV, No. 7.*

PROCEEDINGS OF THE SECOND ANNUAL MEETING
OF
The Mysore Agricultural and Experimental Union,
held at the Office of the Director of Agriculture on the 3rd
and 4th of November 1919 and at Hebbal on the
5th of November 1919.
First Day—3rd November 1919.

Dr. Leslie C. Coleman, M.A., Ph.D., in the chair.

The Proceedings began at 12 noon with the welcome address by the President of the Union Dr. Leslie C. Coleman, M.A., Ph.D., Director of Agriculture in Mysore.

After the presidential address came the report of the Hon. Secretary of the Union Mr. Gundappa S. Kurupad, B.A., Vice-Principal of the Agricultural School at Hebbal. The report, after being read, was accepted by the members on the motion of the president.

A statement of the magazine of the Union was then read by the Editor Mr. A. K. Yegnanarayana Iyer, M.A., Deputy Director of Agriculture in Mysore. The president remarked on the high literary and agricultural standard of the Journal and said that the contribution by members to the Journal was small.

A discussion then took place about the ways and means of making the Journal more widely known and to secure a better circulation for it. Mr. Gopalaswamy Iyer proposed converting the Journal into a bi-lingual one—the Journal to contain a few articles in English and a few articles in Kannada. This proposal was seconded by Mr. Appanna Iyengar who said that the ryots would appreciate articles in Kannada. Mr. Yegnanarayana Iyer pointed out that it was decided at the last annual meeting to have a Journal in English since all members are supposed to have a knowledge of English. Mr. T. Narasinga Rao said that if the circulation of the Journal had to be increased, it was necessary that vernacular articles should be introduced. Dr. Coleman said that the carrying on of scientific Experiments was quite distinct from appreciating the results of such Experiments. He said that the results of Experimental work should be available to all. Mr. H. Sreenivasa Rao proposed that the Journal should be published in two separate parts, one in English and the other in Kannada containing the principal contents of the English one. Separate publications were advised

since the price of a combined Journal would be too heavy for many of those who would desire to take in the vernacular part alone. Their number being considerable, it would be advisable to publish the Kannada Journal quite separate from the English one. This amendment was seconded by Mr. H. V. Krishnayya and supported by Mr. N. Venkatasubbayya who said that the Kannada Journal of Bombay had a wide circulation in many parts of the province specially in Hassan showing the need there is for a Kannada Agricultural Journal. Mr. Yegnanarayana Iyer said that in view of the importance and necessity of having a Kannada Journal, we might have a journal entirely in Kannada and not in English at all. The Kannada Journal might be made very good. Mr. Kunhi Kannan seconded the amendment. Mr. Gopalswamy Iyer was of the opinion that the English publication should not be dropped. Mr. V. K. Badami said that the English Journal should not be discontinued since the Journal was intended to reach the European planters, since outside articles were invited and since a high level could not be maintained in Kannada. Mr. Sreenivasaiengar was of the opinion that correspondence in Kannada was not easy and that many would prefer English. Translation would be a heavy task and he therefore suggested only the results should be translated and published in Kannada. The discussion was then explained to Mr. Bheema Rao in Kannada separately. The amendment by Mr. Yegnanarayana Iyer was put to the vote and lost. Mr. Sreenivasa Rao's amendment was next put to the vote and passed by an over-whelming majority.

The reading of papers on the agenda was next taken up.

Mr. Lingegowda read his paper on his "Experiences with the Seed Ragi supplied from the Department and the work with the bar share plough."

In the discussion after the paper was read, Mr. Sreenivasa Rao said that his experience with K. M. ploughs with D.P.W. shares was very unsatisfactory. He preferred to use foreign made shares as they would last from 6 to 7 acres. The Syracuse Plough, though heavier than the K. M. worked very well. His complaint was that the wooden beams supplied with the K.M. ploughs break easily. He suggested the use of *matty* wood for the purpose. Mr. Gopalswamy Iyer said that he had replaced the wooden beams of his ploughs by iron ones on the pattern of the Verity plough, and found them quite satisfactory. Mr. Parameswara Iyer said that

the cutting part and moldboard of the P. W. D. plough were unsatisfactory. The K.M. Plough was much better in these respects. If the end of the bar in the P.W.D. bar was flattened, he thought it would work better. He was of the opinion that even the Syracuse was not so good as the K. M. Plough. Mr. T. Narasinga Rao said that he was using the K. M. Plough in the wet lands, and in working sandy lands such as he had the shares were out in ploughing 6 acres. He said that the plough was very satisfactory for puddling wet lands and for ploughing in green manure. Mr. Srinivasa Rao suggested the introduction of the bar share into Kolar Mission Plough. Mr. Singrachar said that a new plough was being made on the Farm. This plough was generally modelled on the K. M. pattern, with a bar share on the Subul pattern, with the carve of the body on the Subul pattern and, with the method of attaching the bar on the Syracuse pattern. In the discussion on the ragi crop described by Mr. Lingegowda, Mr. Parameswara Iyer said that the Maddayangiri had not done equally well in all places. Mr. Srinivasa Rao said that in his experience Maddayangiri Ragi had done very well and that it withstood drought much better than other varieties. Mr. Sreenivasa Iyengar said that the Maddayangiri not only withstood drought but did well even on soils which were considered too poor for local varieties. Mr. V. K. Badami said that the ryots believe Hullubile is more nutritious. The Maddayangiri seed was bigger giving a larger yield by volume. He said that for comparative trials only selected seed supplied by the Department should be used and to insure good seed he advocated the use of registered numbers. Mr. Yegnanarayana Iyer said that Hullubile did well only on good soils. Maddayangiri took a longer time to mature and its grain was not heavy; but it gave more straw. He said that Hebbal selected ragi was always much better than the local Maddayangiri ragi. Continued selection was desirable. Mr. Gopalaswamy Iyer said that he had obtained about 900 seers of ragi per acre with the improved seed. Mr. Yegnanarayana Iyer said that some people were making comparative trials. Mr. Devlappa from Shimoga said that he had not succeeded with the selected ragi. Mr. Bheema Rao urged the working out of the fodder value of the various strains of improved ragi. Dr. Coleman pointed out that actual measured yields were necessary in addition to weighed yields.

Mr. Kunhi Kannan read his paper on "Mysore Agricultural Economics, a plea for its study." In the discussion that took place

Mr. Ramachandra Rao emphasised the difficulty of getting accurate information. Dr. Coleman pointed out that the members could furnish accurate data. Mr. Appanna Iyengar said that the results of calculations made from information obtained in Sagar and Nagar were very similar to those obtained and published by Dr. Mann of Poona. Dr. Mann's study was very comprehensive; but we might restrict ourselves to a narrower field. Dr. Coleman said that we did not know what we actually make out of any particular crop. This information could be supplied by members; some of whom might collect data about village economics. Mr. Gopalaswamy Iyer said that enquiries must be made by reliable people who would collect accurate information. He said that more extensive reading was necessary before an enquiry of the kind suggested in the paper could be started. He said that forms of questions might be printed and distributed to the members on the pattern of the Social League. He urged the defining of the lines of enquiry. Dr. Coleman asked if it was not worth while for members to keep accounts. He said that the best farmers kept accounts as they had to find whether their business was paying or not and why it was so. Mr. Sreenivasa Rao said that ordinarily cultivators have got some impression about their business; but they did not keep accurate accounts, and a committee might be appointed for giving a method of keeping accounts. Dr. Coleman suggested a series of forms. Mr. Yegnanarayana Iyer proposed that a committee consisting of Messrs. D. G. Ramachandra Rao, T. Narasinga Rao, and R. Gopalaswamy Iyer may be appointed with power to add to their number to draw up a set of account forms in order that the cultivator might know how he was farming, whether he was gaining or losing. This proposition was seconded by Mr. Badami. The resolution was put to the vote and carried unanimously.

Mr. Pala Iyengar then read his paper on "The Advantages of good cultivation in cocoanut gardens and its effect during droughty seasons." In the discussion that followed Dr. Coleman said that figures of bad seasons also should have been given. Mr. Sreenivasa Rao said that cocoanut gardens thrive if the land is kept in good tilth. The object of ploughing is to catch all the precipitation. He said that ryots are keen about keeping their cocoanut gardens well cultivated. Mr. Ramachandra Rao said that the K. M. Plough is being used by many in their cocoanut gardens. Mr. Yegnanarayana Iyer said that the disc harrow might be useful in cocoanut gardens. Dropping of leaves and nuts in some gardens

might be due to excess of water which is impounded for use by the plants.

The gathering adjourned for lunch at this stage. After lunch the papers by the Agricultural Inspectors were taken up.

Mr. B. R. Guru Raja Rao read his paper for Shimoga District, on Sugar-cane cultivation and storing of fodder as silage. During the discussion that followed, Mr. T. Narasinga Rao said that grass was available only till November. If this grass could be preserved as silage it would come in handy into the following summer; water percolating into the pits had to be avoided and he thought that it would succeed if the pits were filled at the end of the rainy season. Mr. Ramachandra Rao advocated the making of Sugar, as a good market existed in the malnad for molasses. Mr. Yegnanarayana Iyer said that the making of boora sugar would pay at present price and that centrifugals might be used to prepare boora sugar. Mr. Kunhi Kannan urged caution as the price of machinery was considerable and the price of sugar might fall. Mr. Badami Krishna Rao said that though sugar-making paid at present prices, it would not pay if the price of sugar fell.

Mr. H. Venkoba Rao read his paper for Hassan District. In the discussion that followed Mr. Krishnappa said that Cheni jaggery which was light in colour went to the market at Tiptur whereas the pattapatty jaggery which was dark in colour went to Mangalore. The malnad people preferred the black kind. He said that cotton did well at Belur though the soil was not black. Mr. Ramachandra Rao said that the size of the pans in the outfit now being demonstrated was rather small and that he would prefer to have pans of bigger size. Mr. Sreenivasaiengar said that people near his place preferred to have the pans as they were.

Mr. C. V. Ramayya read his paper for the Bangalore Division. In the discussion that followed Mr. Sreenivasaiengar wanted particulars about transplanted ragi and was told that near Bannerghatta this practice was followed and the yield obtained were very good. Mr. Ramachandra Rao suggested the planting of ragi in rows one foot apart leaving one foot from plant to plant. Mr. S. V. Sharma said that the transplanting required much labour.

Mr. M. S. Ramachandra Rao read his paper for Nanjangud division. Discussion followed during which Mr. Yegnanarayana Iyer said that brokers at Nanjangud manipulated prices and that 60 mds. of cotton were obtained per acre, from non-irrigated Cambodia

cotton which was sown during September and October. Mr. Parameswara Iyer suggested the giving up of the growing of cotton in the area as the price realised was low owing to the distance to the market. He said that Doddahatti was grown on black soils and Sannahatti on red soils. Mr. T. Narasinga Rao said that he had used bonemeal on paddy with good results in combination with oil-cakes. Farm manure could not be carted long distances and he therefore favoured the use of hongey and oil-cakes which were also effective in killing the crabs. He said he was also using superphosphate. Mr. Lingegowda said that he had used artificials bought of Messrs. Parry with success. Mr. Sreenivasaiengar doubted if cakes would be profitable to use if their prices went up. Mr. Yegnanarayana Iyer said that manure in bags is appreciated by cultivators. The president then announced that there would be a demonstration of the Fordson tractor on Mr. McIssac's Estate and those who liked to attend were invited to do so. He said that there would also be demonstrations in the Mycological, Chemical, and Entomological laboratories. With the announcement that the meeting would commence at 1 p.m. the next day, the day's proceedings came to a close.

4th November 1919.

The proceedings began at 1 p.m. with Dr. Leslie C. Coleman, M.A., Ph. D., in the chair.

Mr. H. Srinivāsa Rao's paper on Beetles in Cocoanut Gardens was read by Mr. Yegnanarayana Iyer. Dr. Coleman characterised it as a valuable paper giving a good deal of information and then it opened for discussion. Mr. Kunhi Kannan said that his section had just started investigation about Cocoanut Beetles. He said that some of the methods usually advocated had been tested and found defective. In addition to castor cake fermenting rice water was sometimes used; but this method was not successful. Light traps were useful. The cocoanut palms were usually attacked during March and June and July. He said that the date palm could not be a rival attraction to the beetles. If a cocoanut garden was surrounded by a belt of date trees, then it might serve as protection. The chief breeding place for the beetles, he said, was the manure pits and garden areas. He suggested that the pupation might take place underground and they were not disturbed when the manure pits were emptied because the bottom of the pit was only just scraped when manure was removed. The difficulty in catching the beetles lay in keeping vegetable matter in a moist rotting state.

He suggested that pits should be made in the shade. Date groves, he said, afford so much of decaying wood that the problem of control of the beetles was very difficult to solve. He said that he would take the paper as a basis for next year's experiments.

Dr. Coleman suggested that figures showing the number of beetles caught every day, would be useful. Mr. Yegnarayana Iyer doubted if the proximity of a date grove would be advantageous, as these served more as a breeding place than as a protection. Mr. Srinivasa Rao said that the attack was protected by twigs. Tops were tied up when transplanted since the leaves if left opening out gave greater chance for the beetles. Mr. T. V. Subramanyam said that cocoanut palms are attacked in spite of subsidiary crops. The protection due to subsidiary crops occurred only when the palms were young. He said that sand was sometimes put on the tops of cocoanut palms to prevent the attack by beetles. He said that date groves served simply as breeding places for the beetles. Mr. Narasinga Rao said that if these were proved, there was a chance of date groves being replaced by cocoanut groves.

Dr. B. Narasimhaiengar read his paper on Pre-war agriculture in Germany. Dr. Coleman said that in matters scientific the German was almost a machine, and that his love for science was almost a passion. The rest of the world had a good deal to learn from Germany in this respect. The amount of experiments carried out in Germany was enormous, and the farmers had complete trust in the results obtained by the scientists. In breeding a better variety, we were getting a more efficient plant taking more food from the soil, constantly, impoverishing the soil. But breeding of better seed gave a starting point to the farmer for further work. He emphasised the necessity of an all round development.

Mr. Bheema Rao read his paper on Cotton Cultivation in Kan-nada. It was suggested that Mr. Bheema Rao should give figures of comparative yields to the Union Journal.

Mr. Narasimhan read his paper on "Parasitic Plants." During the discussion that followed Mr. Ramachandra Rao said that striga was severe on sugar-cane, ragi and jola, and that in some places, striga had wiped out crops of ragi. Two years' rotation with horsegram did not seem to have any effect. If the field left fallow for 5 years, the striga became less. He said that the white flowered variety was more common in regions with heavy rainfall. He said that striga fruited after ragi was harvested and that ploughing soon after the harvest of ragi would be beneficial. If ploughing

was done even before ragi was ripe, he said that striga would be killed even though the crop of ragi was lost. He said that striga also affected paddy.

Mr. Subramanyam said that rotation had no effect on striga near Hosadurga. Dr. Coleman suggested the sending up by the members of all the information about striga. Mr. Narasimhan said that the parasite on mango and neem could be got rid off by lopping off the affected branches in the early stages. Mr. Sharma in suggesting the use of the plant said that navane and sajje were not attacked by striga. Mr. K. M. Gururaja Rao said that striga occurred more plentifully on red than on black soils.

At this stage the meeting adjourned for lunch. After lunch, Mr. Thotappaiah read his paper on the Cultivation of Turmeric and Ginger and Cotton. Dr. Coleman suggested the sending in of diseased samples of ginger for examination. Mr. Thotappaiah wanted that facilities should be afforded for his learning the curing of ginger. Mr. Kunhi Kannan promised help in getting the information in Malabar.

Mr. V. K. Badami read his paper on "Sugar-cane in Mysore". Mr. Appanna Iyengar wanted details of the Palahally concern and the cost of making sugar from jaggery. There was a discussion about the refining of sugar and using the molasses in a distillery. A central refining factory with a distillery attached to it could be worked as a large concern. Dr. Coleman gave some interesting details of the Nellikuppam sugar factory and how the factory purchased canes on the basis of jaggery that could be obtained when the cane was crushed for the making of jaggery.

M. T. Rangaswamy read his paper on the "Hebbal Co-operative Dairy." Dr. Coleman mentioned that this was the first co-operative dairy in the State and that the organisers had to be congratulated on their attempt. Mr. Appanna Iyengar said that it would be instructive if figures for the past year were published.

The chairman announced that both the morning and evening functions would be held on the Hebbal Farm the next day and this brought the meeting to a close.

5th November 1919.

The members went round the Farm in the morning. The Rajah reaper was kept in readiness to work: but the ground was very wet owing to a fall of rain the previous evening. The various experiments were explained in detail to the members in the dry area,

arrangements had been made for the trial of the new plough made on the Farm. The trial was made and the plough was pronounced a success by the visitors.

Rain interfered with the breakfast which was in consequence rather late. The meeting commenced at 3 p.m. with Dr. Leslie C. Coleman in the chair.

The papers of the Agricultural Inspectors which were not read the previous day and were to have been read this day were taken as read owing to want of time.

Mr. M. Subba Rao read an account of his farm for the previous year. Dr. Coleman said that the paper was very interesting, and said that no depreciation on bullocks had been calculated. Mr. Badami said that depreciation of 4 per cent on implements was rather low and suggested the use of a harrow to help germination of seed when the surface of the soil was crusted up.

Mr. Gopalaswamy Iyer then proposed that Government be requested to suggest to the District Boards, etc., the propriety of making some contributions towards the expenses of the Journal. Mr. Yegnanarayana Iyer moved an amendment to the effect that the District Boards be addressed direct. This amendment was accepted and the President was requested to take action.

Mr. T. Rangaswamy enquired what progress had been made in regard to the "Colonization Scheme." The President promised to address Government and expressed the hope that some action would be taken before the next general meeting.

The election of office bearers then took place. After a few preliminary remarks by Dr. Coleman that the aim of the Union ought to have a non-official president, Mr. Kunhi Kannan proposed that Dr. Coleman be elected president and Mr. Yegnanarayana Iyer Vice-President for the ensuing year. This proposal was seconded by Mr. D. G. Ramachandra Rao and when put to the meeting was carried unanimously. For the Secretaryship,

Mr. Gundappa S. Kurpad was proposed by Mr. Krishnappa and seconded by Mr. H. Srinivasa Rao and supported by Mr. T. Narasinga Rao.

Mr. V. K. Badami was proposed by Mr. K. M. Gururaja Rao and seconded by Mr. M. G. Singrachar.

Mr. S. Lingegowda was proposed by Mr. Yegnanarayana Iyer and seconded by Mr. Kunhi Kannan.

Mr. R. Gopalaswamy Iyer was proposed by Mr. Lingegowda and seconded by Mr. Abdul Basith Sheriff.

Mr. N. Venkatasubbayya was proposed by Mr. Seshadri Iyengar and seconded by Mr. Parameswara Iyer and supported by Mr. Pala Iyengar.

Mr. Gundappa S. Kurpad and Mr. V. K. Badami were allowed to withdraw from the competition on their requests. Voting by ballot then took place.

Voting by ballot then took place.

Mr. Venkatasubbayya getting ... 21 votes.

„ Gopalaswamy Iyer getting ... 20 „

„ Lingegowda getting ... 16 „

Mr. Venkatasubbayya was declared duly elected as Hon. Secretary.

For the Committee, proposals were called for and the voting by ballot took place, with the result that the following were declared elected members of the executive committee :—

- | | |
|------------------------------|---------------------------------|
| 1. Dr. B. Narasimha Iyengar. | 7. Mr. McIssac. |
| 2. Mr. R. Gopalaswamy Iyer. | 8. Mr. K. Kunhi Kannan. |
| 3. Mr. Lingegowda. | 9. Mr. M. Subba Rao. |
| 4. Mr. Gundappa S. Kurpad. | 10. Mr. T. Narasinga Rao. |
| 5. Mr. N. Krishnaiengar, | 11. Mr. H. Sreenivasa Rao. |
| 6. Mr. V. K. Badami. | 12. Mr. D. G. Ramachandra Rao.. |

The discussion of next year's work was then taken up.

The determination of the comparative efficiency and cost of improved and local ploughs based on actual working through one season was undertaken by :—

Mr. K. Krishnamoorthy, Agricultural Inspector, K. M. Plough at Chennarayapatna.

- „ H. Sreenivasa Rao, K. M. Plough at Malur.
- „ Thotappaiah, Eureka Plough at Kumsi.
- „ Lingegowda, Bar Share Plough at Vasantapur.
- „ Bhima Rao, Verity and K. M. Ploughs at Chennagiri.
- „ Nagegowda, K. M. Plough at Mulabagal.
- „ B. Sreenivasa Rao, Agricultural Inspector, Verity Plough at Holalkere.
- „ K. Nagappayya, „ „ Eureka Plough at Kunigal and K. M. Plough at Tumkur.
- „ M. Seshagiri Rao, Agricultural Inspector, K. M. Plough at Tiptur.
- „ S. H. Bennur, Meston and Eureka Ploughs in the Malnad.
- „ C. Krishna Rao, Agricultural Inspector, K. M. and Meston Ploughs at Maddur, and Bar Share Plough at Mandya.
- „ R. Sreenivasa Rao, Work on cocoanut beetles.

Different varieties of seed were undertaken to be tested by—
Mr. Thotappiah, Castor and Cotton.

- „ Veerappa of Hole Hanasavadi, Sugar-cane.
- „ Lingegowda, Ragi and Castor.
- „ M. Subba Rao, Paddy and Ragi.
- „ T. Narasinga Rao, Paddy.
- „ H. Sreenivasa Rao, Groundnut.
- „ H. Krishnappa, Kar Paddy.
- „ C. Bheema Rao, Cotton.
- „ N. S. Rangaswamy, Paddy.
- „ Parameswara Iyer, Kar Ragi, Castor and Cotton.
- „ Pala Iyengar, Paddy and Ragi.
- „ McIssac, Ragi, Groundnut and Castor.
- „ Gopalaswamy Iyer, Ragi and Castor.

Collection of Economic Statistics was undertaken by :—

- Mr. N. S. Rangaswamy.
- „ H. Krishnappa.
- „ C. Narasinga Rao.

The election of the Editorial Board was on the suggestion of Dr. Coleman left to the Executive Committee. On the suggestion of one of the members, the President said that copies of the Annual Conference Reports would be sent to the members of the Union who applied for them.

The President in declaring the session closed said that he was glad to see that so many of the past students and non-officials had taken part in the deliberations of the Union and hoped that the enthusiasm of the members would increase in course of time and not diminish. A hearty vote of thanks to Dr. Coleman was proposed and responded to. Mr. Kunhi Kannan proposed a vote of thanks to the retiring Hon. Secretary for pioneer work during the previous years and for the excellent arrangements in connection with the annual meeting. This was heartily responded to and the meeting dispersed.

Notification by the Director of Agriculture in Mysore.

OFFICE OF THE DIRECTOR OF AGRICULTURE
IN MYSORE, BANGALORE,
March 25th, 1920.

Circular No. C. 641.

AS requisitions for candidates to fill the posts of Managers of private estates are being received by the undersigned, the passed students of the Agricultural School desiring employment are requested to have their names registered in this office with details of the minimum emoluments and other conditions which would induce them to take up such service. The availability of these posts will from time to time be intimated to those whose names have been registered.

LESLIE C. COLEMAN,
Director of Agriculture.

ADVERTISEMENTS.

Applications, in the subjoined form, are invited up to the 25th April, 1920, from qualified persons for the posts of 2 overseers to extract and supervise agricultural and other works in the new Estates of Ramanathapura and Malleswara situated in the late Villages of Kodichamanhalli and Bettahalli respectively of Hampapur Hobli in the Heggadadevankote Taluk, Mysore District. Each application shall accompany testimonials and certificates of conduct of the applicant. Preference will be given to high merits.

1. The posts are naturally permanent ones, but the selected applicants will at first be taken on probation for at least one year and afterwards, if their services and conducts should prove to be satisfactory, they will be confirmed on their posts.

2. Out of the 2 posts, one carries a monthly salary of Rs. 30 and the other of Rs. 25 with the annual increment of Rs. 2 per month up to Rs. 40 and Rs. 35 respectively. The right of giving further increment of their salary will rest on the pleasure of the Proprietor, free quarters for their accommodation and an estate conveyance or a pony, in case of their journey to distant places, are available on duty.

3. The applicants shall have a good knowledge of Canarese and English and of maintaining regular accounts of the business. They are required to be moderate in temper, adventurous, honest and skilful in extracting timely regular works from the menial servants of the estates.

4. The selected applicants, when on duty, shall have to be in charge of all the stores, animals and cash imprest of the estate and deal with them as time requires them to do so for proper discharge of the works in the estate. It is therefore necessary for them to pledge a cash security of Rs. 500 and of Rs. 450 respectively deposited in any of the Government

Savings Bank in Mysore or an immovable property of the value of Rs. 2,000 and Rs. 1,800 respectively. They are also required to enter into an agreement with the proprietor and execute it on a stamp paper to the effect that they should discharge in the best manner that may possibly be expected according to their merits, all sorts of works which may be entrusted to them, by the proprietor.

5. The proprietor has reserved the power of rejecting any application without making out any cause for doing so.

(Sd.) SAKAMMA,

Wife of N. JAVARAPPA,

Jamindar, Santhepet, Mysore.

MYSORE,
5th March, 1920.

FORM OF APPLICATION.

1. Name in full.
2. Father's name.
3. Caste with internal particulars.
4. Age and date of birth.
5. Place of residence and address in full.
6. Profession, if any.
7. Highest examination or examinations passed and the year in which he passed.
8. Whether the applicant was formerly employed in any of the Government or private estates in India, if so, for what period of time, he was employed? and when he left it? and for what reason?
9. For what object, the applicant offers himself to undergo the private employment and does he agree to all the conditions mentioned in the Jamindar's Notice of the 5th March 1920, and for what post he has applied.

Station,

Dated,

Signature,

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THESE Pumps have proved to be the most successful yet designed for irrigation purposes. They have a minimum of wearing parts; are durable, simple and easy to fit up and CHEAP.

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Packed in 1 lb. and $\frac{1}{2}$ lb. tins.

Price Re. 1-2-0 per lb., packing and postage extra.
Arrangements can be made for sending
daily consignments.

Apply to:

The Dairy Inspector,
Hebbal Experimental Farm, P. O.